

IN THE DRAWINGS:

The attached sheets of drawings include changes to Figures 1-6. These sheets replace the original sheets including Figures 1-6.

Attachment: Replacement Sheets

REMARKS

This is intended as a full and complete response to the Office Action dated July 2, 2007, having a shortened statutory period for response set to expire on October 2, 2007. Claims 1-10 have been examined.

Drawings

The Examiner indicated in the Office Action that Figures 1-6 contains hand drawn aspects which are unclear. In response, Applicants have redrawn Figures 1-6, accordingly.

Claim Rejections Under 35 U.S.C. § 103(a)

The Examiner rejected claims 1-8 and 10 under 35 U.S.C. § 103(a) as being unpatentable over Pruneri (2003/0002766) in view of Sugamata (EP 0813 092). In response, Applicants have amended claim 1.

As amended, claim 1 includes the limitation of a Z-cut lithium niobate substrate having two generally parallel waveguides lying beneath a buffer layer of dielectric material, and a first ground electrode, a second ground electrode and a hot electrode disposed on the buffer layer, the hot electrode and the first ground electrode being proximate to at least a part of the respective waveguides and the first ground electrode having a width approximately equal to the width of the respective waveguide. As admitted by the Examiner in the Office Action on page 5, neither Pruneri nor Sugamata explicitly teaches that the first ground electrode has a width approximately equal to the width of the waveguide beneath it. Pruneri teaches a ground electrode 8 that does not have a width approximately equal to the width of a waveguide 42 (see Pruneri, Figure 2). Pruneri further teaches that the ground electrode 8 is used for applying a modulating electric field for varying the refractive index in the waveguide 42, whereby the shape and the layout of the electrode is designed to allow the operation of the device up to the microwave region of the spectrum of the modulating electric field (see Pruneri, paragraph 0016). Having arrived at a desired shape and layout, a person of ordinary skill in the art would not have been motivated to alter the configuration of the ground electrode 8 in any way as that would lead to a change in the device characteristics away from the optimum point. In a similar manner, Sugamata illustrates in Figures 5 and 6 a ground electrode 5a whose width is significantly larger than the width of the respective waveguide 2b. Sugamata further teaches that the electric field F is spread due to the

fact that the ground electrode 5a has a wider width than a hot electrode 4, and thus the interaction between the electric field F and the lightwave propagating along the optical waveguides 2a and 2b is decreased and the high driving voltage is required (see Sugamata, col. 4, lines 45-50). For the reasons set forth above, it would not have been obvious to one of ordinary skill in the art at the time of the invention to employ a ground electrode with a width approximately equal to the width of waveguide therebelow in order to optimize the effective index of refraction and/or driving voltage for the waveguides, as asserted by the Examiner. Therefore, Applicants respectfully request the 103(a) rejection of claim 1 be removed and the allowance of the same. Additionally, since claims 2-8 and 10 depend from claim 1, these claims are allowable for at least the same reasons as claim 1.

The Examiner rejected claim 9 under 35 U.S.C. § 103(a) as being unpatentable over Pruneri in view of Sugamata and in further view of Seino (5,404,412). Applicants respectfully traverse the rejection. Claim 9 depends from claim 1. As set forth above, the combination of Pruneri and Sugamata fails to teach or suggest all the limitations of claim 1. Further, Seino fails to cure the deficiencies of the combination of Pruneri and Sugamata. For these reasons, Applicants submit that claim 9 is in condition for allowance and respectfully request withdrawal of the § 103(a) rejection.

New Claims

New claims 11-19 have been added to claim aspects of the present invention. Applicants submit that no new matter has been added. Applicants believe that none of the cited references discloses or suggests, alone or in combination, the features recited in claims 11-19.

With respect to claims 11-12, the cited references fail to teach or suggest an optical modulator comprising a Z-cut lithium niobate substrate on which is formed a Mach-Zehnder interferometer having two generally parallel waveguides lying beneath a buffer layer of dielectric material, and a first ground electrode, a second ground electrode and a hot electrode disposed on the buffer layer, wherein the first and second ground electrodes are spaced on either side of the hot electrode such that the spacing between the first ground electrode and the hot electrode is different from the spacing between the second ground electrode. In Pruneri, the ground electrodes are equally spaced relative to the hot electrode, and Sugamata specifically states that

the ground electrodes are symmetrical with respect to the hot electrode. Further, Seino illustrates only a single ground electrode spaced relative to a hot electrode.

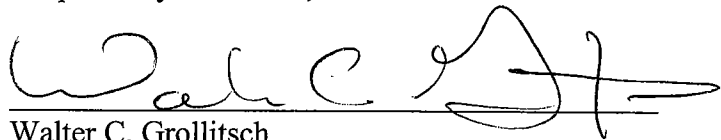
With respect to claims 13-19, the cited references fail to teach or suggest an optical modulator comprising a Z-cut lithium niobate substrate on which is formed a Mach-Zehnder interferometer having two generally parallel waveguides lying beneath a buffer layer of dielectric material, wherein the hot electrode and the first ground electrode each have a width substantially less than that of the second ground electrode and wherein the spacing between the first ground and hot electrodes is different from the spacing between the second ground and hot electrodes. Pruneri teaches that the first and second ground electrodes 8, 10 are equally spaced relative to the hot electrode 4 and that the width of the first ground electrode 8 is not substantially less than that of the second ground electrode 10, and Sugamata teaches that the width of the first ground electrode 5a is not substantially less than that of the second ground electrode 5b and that the ground electrodes 5a, 5b are symmetrical with respect to the hot electrode 4. Further, Seino teaches only a single ground electrode spaced relative to a hot electrode in Figure 24a.

Therefore, Applicants believe that new claims 11-19 are in condition for allowance and respectfully request the same.

Conclusion

Having addressed all issues set out in the office action, Applicants respectfully submit that the case is in condition for allowance. If the Examiner has any questions, please contact the Applicants' undersigned representative at the number provided below.

Respectfully submitted,



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